AMERICAN ELECTRO-PLATERS SOCIETY

(An Educational Society)

Chartered 1909

MONTHLY REVIEW

FEBRUARY, 1916

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A NEW COMMANDMENT.

A new Commandement I would make,
To rid the world of all its fear:
Thou shalt not fail each morn to take
Thy portion full of goodly cheer;
The which, a gift of golden Love
In form of light, streams from above
To show the path for them that grope
On to the splendid heights of Hope.

MONTHLY REVIEW

American Electro-Platers' Society

(An Educational Society)

Vol. 3 FEBRUARY No. 2

EDITORIALS

NOTICE

To Members of the American Electro Platers Society:

In order to get the fairest possible vote in awarding a trophy for the best paper presented at the 1915 convention, members are requested to give careful consideration to these papers. The branches are requested to decide which paper, in their opinion, was the best contribution to our knowledge of the art of electroplating submitted on that occasion. It is suggested that this matter be discussed at the March meetings of the branches and the result of the vote sent to the office of the Secretary-Treasurer as soon as possible.

The papers to be considered are the following:

The Commercial Aspects of Electroplating with Cobalt, by J. W. Barrows, published in June, 1915.

Address by J. W. Hogaboom, published in July, 1915.

Address by J. W. Proctor, published in June, 1915.

Some Experiences with Grain as Shot Nickel Anodes, by Walter Fraine, published in August, 1915.

Single Nickel Solutions and Results I Get, by E. W. Heil, published in August, 1915.

Historical Review of the Electrical Deposition of Copper, by Newark Branch, published in September, 1915.

Slime in Nickel Solutions, by Jos. Walters, published in September, 1915.

The Metric System, by F. A. Shepherd, published in September and October, 1915.

Motion Plating, by H. J. Richards, published in October, 1915.

Plating Contradictions Explained, by H. J. LeDoest, published in December, 1915.

and ornaments of bronze, that had on them traces of silver and gold. In the depressions or background of these works of ancient art, thin films of gold and silver were found, showing that the finer metals were placed on the baser ones, after the article was made. How old these pieces are, no one is able to tell accurately, but they are undoubtedly of ancient Greek origin, which would indicate that the ancient Greeks knew the close plater's art.

Another of the plating processes which preceded the use of electricity, was that used for the production of the celebrated Shef-

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A NEW COMMANDMENT.

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THE HISTORY OF ELECTRO-PLATING.

By J. H. HANSJOSTEN, Former Supreme President A. E. S.

The covering of an inferior metal with a thin coating of a superior one, so as to produce the illusion that the entire mass was composed of the finer metal, thus making it more beautiful, and adding greatly to the wearing or lasting qualities of the object was practiced by all civilized people at a very early period of the world's history. The methods then employed are used to a very limited extent today, for the close plater of today may be compared to the ancient artisan who fashioned lamp bowls and ornaments of bronze and copper and covered them with gold or silver leaf. The main difference in their manner of working, is perhaps, this: The modern close plater buys his gold and silver leaf of the thickness that he needs, while his predecessor of ancient times spent days in hammering his silver to make it as thin as needed.

The process of guilding by the use of an amalgam of gold and quick silver goes back to Roman times and Pliney gives a description of a process employed in his time.

The older process of the oriental world are believed to be reflected in those used in India today, where a coat of mercury is applied to a carefully prepared copper surface and forming an amalgam with the copper, is covered in turn with gold leaf which combines with the mercury, the latter being subsequently removed by heat. The brilliancy of the gold is then brought out by rubbing with agate burnishers.

Some years ago there were excavated in the Crimea statues and ornaments of bronze, that had on them traces of silver and gold. In the depressions or background of these works of ancient art, thin films of gold and silver were found, showing that the finer metals were placed on the baser ones, after the article was made. How old these pieces are, no one is able to tell accurately, but they are undoubtedly of ancient Greek origin, which would indicate that the ancient Greeks knew the close plater's art.

Another of the plating processes which preceded the use of electricity, was that used for the production of the celebrated Shef-

field plate, and goes back to 1742 when Thomas Balsover accidentally discovered that it was possible to coat an inferior metal with a superior one by means of fusion. This led to the foundation of the Sheffield works by Joseph Hancock. For more than a century Sheffield plate had a world-wide reputation. A reputation built on Balsover's accidental discovery, and for more than a century his process of plating was used in the Sheffield works. At the present day it is said this process finds use only in the making of reflectors.

In 1801 Wallaston observed that by connecting a piece of silver with some more positive metal, such as zinc, and placing both in a copper solution, the silver would become coated with copper. This followed the experiments of Nicholson and Carlisle in the decomposition of metals by electricity.

The earliest firm of electro-plating was that known as S. R. & H. Ellsington, who executed "sound experimental," as early as the beginning of the year 1838.

It has been stated that Ross even did gold plating in 1834 using a battery to supply the current.

In 1842, one hundred years after Balsover's discovery, there was founded in France the house of Christofle & Co., who soon did an immense business, and demonstrated the superiority of the electro process over Balsover's process, so that within a few years the latter was discarded by most of the concerns doing plating, after having been in almost universal use for more than a century.

During the forties of the last century, William Rogers and his brothers became interested in electro plating and in 1847 began the manufacture of the silverware that made the name Rogers known throughout the civilized world. How the famous silverware concern grew from the little New England blacksmith shop, where William Rogers fashioned spoons out of silver, the New England village and farm folks brought to him, was told in an advertising story published by them some years ago in the leading magazines of America. It read like a romance, and yet it gave the true story of an ideal, and of a firm that for three-quarters of a century lived up to that ideal.

Nickel plating was done on a commercial scale in the sixties and early seventies in the New England States. Most of the plants then doing nickel plating were paying royalties to the United Nickel Company of Boston, owners of the Adams patents covering nickel plating. Their patents were generally considered unjust, and royalties on nickel plating processes were collected for only a short time.

Dynamos were at this time practically unknown and it was not until 1875-76 that Edward Weston perfected the first practical dynamo. From that time on the development was rapid.

Improvement after improvement followed each other in rapid succession, and in a comparatively short time the United States led every country in the world in this industry, and in the late seventies American-made dynamos were replacing the batteries in the oldest electro-plating plants of Europe.

It is worthy of note that in the late seventies nickel anodes were selling at $4.00 per pound and nickel salts at $1.75 per pound.

How since then the art has developed and grown into one of

the important factors of the industrial world is known to most of us by personal experience. We know that it has not yet reached perfection, but we can, by our united efforts in our society, hasten the day, when we will all be more proficient in our profession, thus making ourselves more valuable to our employers, more valuable to humanity and more valuable to ourselves.

PICKLING AND STANDARDIZING.

By JOSEPH WALTERS, Richmond, Va.

Replying your questions regarding what sort of pickle do I prefer for stove work, and what kind have I found practical, also what is my standard nickel solution for stove work, will say that you are probably aware that I am opposed to pickling castings to soften them, and do not use any pickling process whatever—being thoroughly convinced that the foundry can and should be made to produce castings of the proper composition, thereby not necessitating the additional expense in the plating-room to soften them. Sulphuric acid is, in my opinion, the acid to use to soften castings, but very injurious after effects are produced, such as peeling and pitting. During the pickling process, sulphates penetrating and remaining in the pores of the castings are not entirely removed. It has been suggested that pitting and peeling are due to oculated hydrogen in pickled castings. This is wrong, because on removing the castings from the pickle they are washed in hot water and otherwise heated, and heat dissolves hydrogen. The sulphates covering the castings on removal from pickle are washed off and further removed by grinding and polishing, but deep down in the pores of the iron it remains, and is only partially removed, or not at all, by boiling in an alkali. Even though the castings seem to be well plated, the sulphates will eventually work through, and we see it first in the appearance of white spots in the nickel, and gradually tears the nickel off.

If the castings are sandy—burnt in the iron—(another fault of the foundry), sulphuric acid will not remove it, and hydrofluoric should be used, but no oxides are formed by this acid. It will remove the sand—silicates or glaze,—but will not soften the metal itself. My contention is that the foundry can and should be made to give us the proper castings, soft and clean for plating, and should not add an unnecessary expense to the plating department. The expense of pickling castings should properly be charged to the foundry, and if our employers should be shown that the cost of pickling can be eliminated, with this better plating at less cost would be the result.

That the nickel-plate on a non-pickled casting is far superior in appearance, physical and wearing qualities, than on pickled ones, the following tests I made will prove:

First: The solution to plate pickled castings must be alkaline—a very objectionable feature for pieces of iron having a background. A nickel-plated background from an alkaline solution will tarnish (become yellow) quicker, and the least touch with the finger leaves a mark difficult to remove. Another objection to an alkaline solu-

tion for plating stove work is that the nickel-plate from an alkaline solution will tarnish at a lower temperature than the plate from an acid solution. The plate on a non-pickled casting will stand considerably more heat before tarnishing.

Physical Properties.—For this I made the following tests: In my regular nickel tank I hung several pickled and non-pickled castings. The non-pickled ones began to plate immediately, giving off very little hydrogen (gas bubbles). The pickled pieces threw off a considerable amount of gas and didn't begin to plate for over two minutes after immersion. At the end of an hour they were removed, dried and weighed, and the non-pickled weighed considerably more than the pickled. The quality, too, showed a marked difference. The pickled castings were harder to buff and required more buffing compound. I then broke two castings—a pickled and a non-pickled one. The pickled one showed a tendency to peel. With a penknife I scraped off a strip of nickel from each, and, rubbing them between the palms of my hands, the strip from the pickled casting crumpled into a powder. The same test was applied to the strip from the non-pickled casting, but bending and breaking failed to pulverize it.

I then tested for lasting qualities: After buffing one of each they were laid away in the same place and under the same atmospheric conditions. Upon examination at the end of four months, the pickled one had begun to show signs of dullness; at the end of six months white spots had appeared, and it was covered with a heavy film of dullness—oxidization—requiring re-buffing to bring it back to its original appearance. The non-pickled one was a bright as when put away. The next experiment I used was to put a pickled and a non-pickled plated casting in a tub of water. After twenty-four hours the pickled one had rusted spots, while on the non-pickled one the nickel was somewhat dull, but no rust or other imperfections were visible.

These are not all the evils of pickling; the annode and cathode deficiency—the maintenance of solution for pickled castings, etc. Of these, I will not enter into the argument, but I know pickling is an evil and an extra expense, and that a superior plate cannot be produced with its use, and I hope to see the day when platers who are compelled to pickle will take the matter up with their employers and prove to them that castings can be produced to specification in the foundry—soft and clean. The manufacturers will then be compelled to acknowledge that the members of the A. E. S. do know something and are doing something.

Now, in regard to the other question you ask: "What is my standard nickel solution for stove work?" By asking this question, you hit me in a tender spot. To be frank, I have none, and doubt if any plater has one. Those who claim to have, and use a standard solution, are, I believe, honestly mistaken. Let us analyze and consider if it is possible to control and maintain a solution standard under commercial conditions. What are the facts in the case? But let us agree, first, what is meant by *standard* when this word is used by platers. If the plater does nothing else but make up new solutions, and always maintains the proportions as the formula orig-

inally calls for, and if on periodical tests of the solution the analysis shows the substances in the same proportion as originally made, then it would be a standard solution. But the average plater is not a chemist, nor is he working in a laboratory where the conditions are always alike. The chemist, when making experiments, is working with known quality of substances and with proper facilities for weighing and measuring. This is not obtainable in the average plating plant. Today we are given a batch of work, say, for instance, a hundred pieces, all alike in shape and size, requiring a certain amount of voltage and amperage; tomorrow or the next day we plate a batch of more or less pieces of different shapes and sizes, requiring a different voltage and amperage. Sometimes our solutions are idle for a day or two or a whole week at a time, or, in the busy season, we are compelled to crowd our work in one tank which should be done in two or more, and twice the length of time, or at other times, the temperature—atmospheric conditions beyond our control—hot one day and freezing weather the next. The solutions work differently under different conditions, but we must get out the plating. We alter and defy all scientific principles and laws. What is the result? A constant change in the compositions of substances in the solution. An analysis will prove that in every change of conditions a change in composition will or has taken place in our solutions. Instead of having, say,

8 oz. of nickel ammonia sulphate,
2 oz. of single salts,
2 oz. of sal ammoniac,
2 oz. of boric acid,

as the original composition of the baths, we have—we don't know what we have unless we analyze the solution daily and can tell positively what changes have taken place during the electrolysis in a day's work. Because of varying conditions a standard solution is not obtained in the average plating plant under commercial conditions. My conclusions, then, are that we do not, nor can we, have a standard nickel solution until we are in a position to know positively the quality of the chemicals and salts we use to make our solutions, and we must be in a position to control conditions. Our employers must be taught that the profession of electro-plating is a science and an art, and should be conducted on scientific principles with established laws.

Platers must know and insist that the manufacturers and supply houses furnish us with chemicals of known quality. In other words, let us discontinue the buying of trade-named, "get-rich-quick" stuff, and in its place buy supplies of known analysis. Then, and not until then, can we have a standard solution.

THE PLATING OF DIE CASTINGS.

By F. J. WADSWORTH, Cleveland Branch.

At our last regular meeting I was asked to prepare a paper on the plating of zinc die castings and will try to explain my experience in that line of work.

Now, I do not think that the composition of the nickel solution has all to do with the successful plating of die castings.

The most important is the way they are handled in preparing them to receive the coating of nickel.

The strength and temperature of the cleaning solution, the distance they are apart on the racks or wires when being plated, and the amount of current used.

I am at the present time using Carlsruhe cleaner, about one-half pound to the gallon of water, at a temperature of 155 degrees, and a current of 5 volts. The work being hung on the negative or cathode rod, the sides of the iron tank as the positive or anode, and find the polish on the castings is not impaired, but comes from the cleaner bright and clean; does not have the granular or filmy appearance they would have if the current was reversed or the solution boiling hot.

I think any of the *cleaners* sold by the supply houses, except strong potash, would answer the same purpose.

After remaining in the cleaner one or two minutes they are rinsed in clean water and struck in a cyanide of copper solution of the same temperature as the cleaning solution, until they are thoroughly coated with copper. The copper solution is weak in free cyanide, but has plenty of copper content.

I also add about 8 or 10 ounces of hyposulphite of soda to the 160 gallons of solution as often as occasion demands, to keep the deposit even and bright.

After being thoroughly coated with copper, they are rinsed in clean water and hung in the nickel solution and a weak current turned on. The current is increased as the tank is filled until I am using about 3½ volts. The anode surface should greatly exceed the cathode surface.

The racks to hold the work while being plated are made of convenient size to handle, and the hooks are so spaced that when filled with castings there remains about the same distance between each piece as the size of the piece itself; any closer would cause the casting to plate very slowly. Owing to the electro-positive nature of zinc, which sets up a counter current in the solution, causing a reduction of the metal, for this reason the work should be far enough apart so each piece will become immediately coated or they will be streaked and cause trouble in the final buffing.

The nickel solution that I used was one that had been in use about ten years and was probably made of double sulphate of nickel, but it has been cleaned out and added to so many times that I doubt if any of the original solution remains, but has been kept up entirely with the single salts and boracic acid and ammonium chloride as conductors.

Before plating the die castings in this solution, I dissolved 20 pounds of sulphate of magnesium in warm water and added it to the 300 gallons of solution, and it plated a nice white deposit of nickel and did not streak or blister.

I have since made a nickel solution of 300 gallons by first filling the tank to nearly the required height with cold water and added single salts to the water until it stood 8 degrees Baum. I then added 20 pounds of sulphate of magnesium, 10 pounds common salt, and 40 pounds of yellow dextrine, all dissolved separately; after which the solution stood 12 degrees and deposited nickel on die casting in from fifteen to twenty minutes that would stand hard buffing without cutting through, but which required little buffing on account of the extremely bright deposit. I can leave the castings in this solution from two to five hours with a strong current and they will remain just as bright as though they were only plated a few minutes.

I have been using this solution several months and plating thousands of castings a day and have had no trouble with streaks, blisters or spotting out.

ANODES.

By The Editor.

Anodes are pieces of metal which are suspended in the plating solution. They are composed of any and every metal which is plated and some which is never plated. Anodes convey the current into the solution; the more anodes, the more current. Anodes are also alleged to supply the solution with metal.

Many years ago, in the Middle Ages, men endeavored (without success) to turn iron into the precious metals. They were undoubtedly trying to make anodes. To this day anode manufacturers have not been successful in this; therefore, nickel anodes are found to contain considerable nickel.

Iron anodes can only be used in a hot copper clean and strike, which works better, no matter what anode you use.

Sometimes gold platers use insoluble anodes. These are composed of platinum. They are very successful, as they keep the plater busy maintaining his solution and keep him from getting lazy.

All anodes cost money. Platinum anodes cost most, but zinc anodes will soon cost more than most. The writer at one time ran a small jobbing shop, and, being financially "busted," used a piece of copper for a gold anode, for three months, with great success. This, however, is not good practice. The supply man has to live.

Brass anodes sometimes scum over while the work is being plated and the plating is thereby retarded. This generally happens late in the day, when it's time to quit, anyway.

We hope the "feller" who promised us a paper on "Anodes" will feel ashamed of himself, now, and kick in with it.

A FEW FINISHES ON LIGHTING FIXTURES.

By W. D. Scott, Cleveland Branch.

The Colonial Brass.—This finish is between a brush brass and polished brass. This is first buffed, then colored as for polished brass. It is then dulled on a soft wheel and common oil, then washed in benzine, dried out in the sawdust, then lacquered with a regular spraying lacquer.

Old English Finish.—Which is also known as Adams Brown. I have tried several ways to get this finish, but I have always gotten best results from the sulphuret dip. The work is buffed and, after being cleaned from all grease, I then run it alternately into potash and sulphuret about three times, when I get a reddish brown tone. I then scratch-brush it wet on a steel wire brush on the parts that show the brown, then run it through once more in the same way; then I have the desired shade. The work is dried in sawdust and lacquered. This may seem a slow process, but I have always found it the best way.

The dull or antique brass is not buffed like the others, but is polished on an oil wheel. I acid-dip all of this work, then stain it to a dark, smutty brown by running it through the potash and sulphuret and a dilute pickle. It is then brushed on a fine brass wire brush and fine pumice stone. This work seems to tarnish quickly, and it is best to have it lacquered as soon as possible.

Another finish is that called "shaded brass." The work is buffed and cleaned in the usual way, then black-nickeled. My solution is made of muriatic acid, white arsenic and iron filings. Work is rinsed in cold, then hot, water. It is then relieved on a Tampico brush with oil and emery, showing black on top and bottom of spinnings and background of castings. Then wash in benzine, dry in sawdust, and lacquer.

The next finish is the antique gold. This work is all buffed fine and cleaned as for plating, then bright-acid dipped, and run once through the sulphuret dip, rinsed in cold and hot water, dried out good in sawdust, then lacquered with a rich gold lacquer to give it the antique appearance. Take a little burnt umber and rub all over the castings with a fine brush, then rub off the high lights with a soft rag and turpentine, leaving the umber in background. This makes a nice finish.

The next finish is called "Etruscan Gold." The work is buffed and cleaned in the usual way, then bright-acid dipped, then run once through the sulphuret to a deep yellow tone, rinsed in cold and hot water, dried in sawdust, and lacquered with a rose-gold lacquer. After the work is well dried in the oven, make a thin paste of powdered gold rouge and orange chrome mixed with turpentine and a few drops of gold size. This is brushed all over the casting with a fine brush. Allow to stand a few seconds, then rub off the high lights, leaving the orange color in the background. This makes a very nice finish.

We have, also, what is called the aureilia gold. This finish doesn't seem to be as well known as the other golds, but we do quite a lot of it. For this finish the work is polished, but not buffed; then acid dipped and run through a black nickel, rinsed in cold water, then dried in sawdust, then sandblasted, then the high lights burnished and lacquered with a gold lacquer. This work should be handled as little as possible, as it is easily stained.

SUNSHINE.

A person may have no matter how little of this world's goods and yet be a powerful blessing to everyone about him if he is sunny —if he radiates sunshine.

There is profit in being sunny—big profit.

It makes things come easier, makes work lighter, dispels trouble, prevents trouble.

Everybody's glad to have a sunny person around. Such a one is a real joy. You never knew of a sunny souled and sunny faced person being unwelcomed. People want to know such a person; they want to be around where he is. No matter how little or much money he has, he is a popular person, an attraction. He wins in the battle of life where countless long-faced or crabbed people lose.

And physicians will tell you that people of sunny natures live lots longer than scowlers and growlers.

This famous soul sunshine we're talking about comes from within. It comes from continually looking upon the bright side of everything. It comes from paying no attention to the thousand and one little things that come along in everyone's life and that so many people make the mistake of becoming cross and ugly over. Sunny natures are made by letting such things go, not allowing the mind to dwell upon them.

Be wise, cultivate and give soul sunshine if you would be happy and prosperous in many ways, and live long in this beautiful world.

Contributed by W. S. Barrows, Supreme President A. E. S

The oxidation of nitrogen was first carried out on a moderately large scale in 1897 by Lord Rayleigh, who obtained considerable quantities of nitric acid from air by means of this electric discharge. Since that time the development of the subject has progressed by leaps and bounds.

Until recently, practically all the nitric acid and nitrates employed in the arts and in agriculture were derived from the nitrate bed of Chile, and it is not to be assumed that these deposits are inexhaustible.

The direct production of nitric acid from air by means of a powerful electric discharge has reached the stage of large scale manufacture. Gigantic works in Norway by the side of a mighty waterfall, erected by foreign factories in conjunction with Norwegian engineers, and supported by French capital are a reality today.

Synthetical saltpetre is already on the market.

The greater the number of such processes and the keener the competition which they excite, the greater the benefit to the consumer.

CURRENT REGULATION.

By E. W. Heil, Wichita, Kan., Member St. Louis Branch.

It has been well said that a plater was three-fourths chemist and one-fourth electrician, and the writer would add that if he were deficient in either, let it be chemistry.

Not that a knowledge of chemistry is unimportant; but, although the greater part of his work is along chemical lines, a plater must have a fair understanding of electricity to succeed at all.

Electric science is founded upon the effects of certain forces upon matter, and all knowledge of the science is deduced from the effects. Electricity has three effects upon matter. A magnetic effect; a thermal or heating effect; a chemical effect. It is the chemical effect the plater has to deal with. To get the desired chemical effect the plater must know the laws which govern the flow of electricity through the electrolyte.

The three principal units used in practical measurements of a current of electricity are: The ampere, the practical unit denoting the rate of flow or the strength of an electric current; the ohm, the practical unit of resistance; the volt, the practical unit of electric potential or pressure.

The resistance of a circuit may be conveniently regarded as that which opposes or resists the passage of electricity or the reciprocal of conductivity. The resistance all substances offer to the passage of an electric current is of great importance in electrical measurements. It is that which determines the strength of an electric current in any circuit in which the potential difference is constantly maintained.

The ohm is the only unit in electrical measurements for which a material standard can be adopted, other quantities being measured by the effects they produce. One international ohm is the resistance offered by a column of pure mercury 106.3 centimeters in length and 1 square millimeter in sectional area at 32 degrees F.

The plater has to deal with two classes of conductors—metallic and electrolytes. Electrolyte is the name given to a liquid which, as it transmits the current, is decomposed by it. As a rule, the resistance of liquids, with the exception of mercury, are enormously high. Nearly all metallic conductors have their resistance increased by an increase in temperature. The electric resistance of electrolytes decreases as the temperature rises. As electrical conductors, electrolytes are in other respects very like metallic conductors. The sistance of a given conductor diminishes as its sectional area increases and increases as the length of the conductor increases. If a given conductor offers a resistance of 2 ohms to a current of 1 ampere, it offers the same resistance to a current of 10 amperes.

The strength of the current can be described as the quantity of electricity flowing continuously every second. The practical unit of the strength of current is the ampere. The international ampere is defined as the strength of an unvarying current which, when passed through a solution of silver nitrate and water, will deposit silver at the rate of .01725 grain per second.

Electromotive force, written E. M. F., or simply E., is the total generated difference of potential in any electric source or any circuit. Electric potential will cause a current to flow against the resistance of a conductor and is measured by the effect it produces. The volt is the practical unit of electric potential or pressure. A unit potential is that E. M. F. which would maintain a current of unit strength in a circuit whose resistance is unity, or a volt is that E. M. F. which will maintain a current of 1 ampere in a circuit whose resistance is 1 ohm.

With a known resistance in ohms and and a known strength of current in amperes, the E. M. F. in volts is determined by Ohms law:

$$\text{E. M. F.} = \text{Current} \times \text{Resistance.}$$

When the E. M. F. and total resistance are known, the strength of current may be determined by the following formula:

$$\text{Current} = \text{E. M. F.} \div \text{Resistance.}$$

To find the total resistance when the E. M. F. and strength of current are known:

$$\text{Resistance} = \text{E. M. F.} \div \text{Current.}$$

Although the quantity of electricity which flows in a closed circuit is the same at all cross-sections, the E. M. F. is by no means the same at all points. It suffers a loss or drop of potential in the direction in which the current is flowing, and it is this difference of electric potential which causes the electricity to flow against the resistance of the conductor. The difference of potential between any two points along a circuit is equal to the product of the strength of the current in amperes and the resistance in ohms in that part of the circuit between those two points.

For example, a plating solution, anodes, rods, etc., is known to have a resistance of .0134 ohm and is using 150 amperes— $150 \times .0134 = 2.01$; and a volt-meter connected across the tank mains would show 2 volts. Now, if the dynamo maintained a difference of 5 volts across the main conductors or bus bars, the voltage would have suffered a drop of 3 volts by reason of the tank rheostat. Then, $3 \div 150 = .02$, and the resistance of rheostat is .0 ohm. $.02 + .0134 = .0334$ or $5 \div 150 = .0334 =$ resistance of entire circuit.

If the plater should then decide to hang a few more pieces of work in the tank, say, 1 square foot of surface, he would thus decrease the resistance of electrolyte by increasing the sectional area and cause perhaps 4 more amperes to flow.

The dynamo still maintains 5 volts across the main conductors and 154 amperes are flowing; then the resistance of entire circuit would be $5 \div 154 = .0324$, and .0324 is resistance of plating tank and rheostat. Since the resistance of rheostat has not changed, $.0324 - .02 = .0124$, and .0124 ohm is resistance of tank with the increased work surface. Then, $.0124 \times 154 = 1.909$, which would

be the volt-meter reading across the tank main. Thus, the ammeter goes up and the volt-meter goes down when more work is hung in the solution. After the area of cathode surface has exceeded that of the anode surface, the effect is not so noticeable.

Insufficient anode surface, dirty anodes or connections or cold solution will greatly increase the omic resistance of a plating tank, and if the plater regulates his current by the voltage across the tank it is evident that at times his work will lack current density and the necessary amount of metal will not be deposited.

NICKEL-PLATING.

By H. J. Ter Doest, Cleveland Branch.

Since the advent of the so-called rapid salts, nickel-plating has been to the front in the plater's mind very much, principally because he has been led to believe that good nickel-plating could not be done with the old-style double salts solution. You are not to understand by this that the rapid solutions are no good, or that they are not better for some purposes; but when someone tells you that he can do so and so much work, with so much help, he is carrying the thing a little too far. For what does it matter what kind of a solution you plate your work in?—as the hanging in and taking out is the same whether you hang it all in one solution or in several, and the cleaning is also the same; so it cannot make any difference in the labor cost, but simply in the solution directly or indirectly, such as interest on investment of the different solutions, tanks, etc., and the upkeep of same; and, furthermore, in the selection of a solution all these things want to be considered. I cannot draw a comparison of cost of equipment, because it would not be the same everywhere.

But the cost of the solution would always be in the same relative proportion and can safely be said, for a solution that is run pretty nearly all the time, to be the first cost, and the same amount for upkeep each year. That is, providing the solution is run self-sustaining. By self-sustaining, I mean a solution that will keep the same relation between metal and conducting salts, by adding the same material as the original solution was made of. Some of you will probably say that cannot be done, but it was done for years by myself and others that did nickel-plating years ago, as the only thing that was put in a nickel solution was double salts, and as good results were obtained then as now.

The way to make a solution self-sustaining is not to have your current density at the anodes too great. For instance, 40 amperes might keep it right when 50 amperes would run it out of nickel too fast. This in turn depends more on the exposed anode surface and the action of the solution than any anything else, and consequently the stronger the solution the greater the current density that can be used; also the more anodes, the more current, and the more work that can be done.

Now, one word: If your solution increases in metal content, as I have heard some platers say theirs did, there must be something the matter with your cathode efficiency, as, where the solution does not attack the anode without the solution, can never increase its metal content; that is, if the cathode efficiency is right, or your solution in proper balance to begin with.

Now, as to the composition of these solutions. Everyone knows that 12 ounces of double salts dissolved in water constitutes the double salts solution; but what everyone does not seem to know is, how simple it is to keep it that way. The best way is not to run it too fast and you will not have to put anything in except double salts to keep it up to 7 degrees Be., unless the temperature falls below 70 degrees Fahrenheit, when it will not dissolve enough to stand over 6 or 6½ Be., according to temperature; but if the specific gravity is below this, and the temperature is all right and it will not dissolve double salts, it is a sure sign that your metal content is low, and a little single salts should be added, when it will again dissolve double salts up to 7 degrees Be. at 70 degrees Fahrenheit.

And now for the rapid solution I use: Ten parts single salts, 2 parts boracic acid, 1 part salt, which can be dissolved up to 22 degrees Be. and contains about 8 ounces of metallic nickel per gallon. This solution can easily be run four times as fast as a double salts solution, but I only run mine at 10 degrees Be. with about 3 ounces of metallic nickel per gallon, and I run my work bright at 4½ volts.

Now, as to maintaining this solution, I have had a great deal of trouble, but after one and a half years' trial have come to the following conclusions:

When your solution is in good order, plate a few trial pieces at different current densities and they should show the same efficiency at all densities or your solution is not in good order.

If the efficiency is poor at low-current density, add some salt to bring it up a little at a time, and try it out again until it plates in proportion to density.

Now, if the efficiency is poor at high-current density, add some single salts a little at a time until it plates right again.

Also, if your work turns black at low-current density, some salt is needed, and if you wish bright work and it comes out of the solution velvety, add some boracic acid again. I repeat a little at a time until it is right.

Now, one word about when your solution is not right: it will never get better unless you work it, so work it all you can while making additions, and when you see, after two or three days you have not added enough, add some more, but be sure not to add too much at one time, but work your solution after each addition for a day or two and so on until your test pieces shows everything to be all right.

As an example of test pieces, I give here an idea of a 3⅜-inch circle approximately 18 square inches in area. At 1 ampere it received a deposit of 1.55 grains and at 1.10 amperes a deposit of 0.42 grains and at 3 1-5 amperes it received a deposit of 4.79 grains.

Now, the first was run at a current density 8 amperes per square foot, and the second 17 amperes per square foot, and the third 25 amperes per square foot, and the time was five minutes. As this is a little over the theoretical efficiency, the meter I used must be a little off, but the relative amounts show a uniform gain at different densities.

The efficiency of this solution (cathode, I mean) is very close to 100 per cent, as at 4½ volts it does not gas any more than a double salts solution at 2 volts. The reasons I use a high-speed solution are twofold: First, because I have some articles to plate that have a zinc back and they come better that way; second, I have some hard rubber pieces that are brass-bound and the brass is to be nickel-plated. Now, if the rubber is not cured just so, it causes gases to rise from between the brass and rubber and streaks the plating so it cannot be buffed very well. To be sure, all this work was done all right before, but it does not require so much looking after, in the high-speed solution.

Another thing I might mention here is that if you do your work on racks, and strip those racks, you will find they do not strip nearly so well from the fast solution as from the double salts solution.

The reason I had so much trouble with my solution probably was because I simply added the 10-2-1 mixture to my old double salts solution until I had 3 ounces of metallic nickel per gallon.

As every shop has its own problems, it would be impossible for me to say which solution would be best for your particular case, but I can truly say that both can do good work, and while the first cost of one solution may be a little lower, the upkeep is a great deal higher or as many times higher as your solution costs more in the first place; for when all is said your upkeep is your drip, and nothing else. Even though you may not run your solution so as to be self-sustaining, the extra single salts used represents a corresponding saving in anodes, as a nickel solution does not decompose as some other solutions do.

In making up a solution, always use boiling water to dissolve your salts, or it may refuse to plate altogether. I have here eight test pieces that were plated in a solution made with cold water, and, while none of them is of any value as a plating, the curious part is, the one that was plated at 1 ampere is the best; the other ones, numbered respectively 2 and 3, were plated with as many amperes and the gas kept them nearly all brass; but the mere mixture with boiling water gave excellent results.

WHAT THE BRANCHES ARE DOING

NEW YORK.

Meets second and fourth Friday of each month at 258 Pearl Street, New York City, 8 p. m. Secretary, Wm. Fischer, 345 East 23rd Street, New York City.

The regular monthly meeting was held Friday evening, January 28th, at their laboratory, with President Reama in the chair.

The Banquet Committee reports that everything is in readiness for the annual banquet to be held at the Broadway Central Hotel, Saturday evening, February 19th, and a successful time is predicted.

In the laboratory work for the month, Mr. Marshall E. Stewart demonstrated the method used in analyzing nickel solution, using Herman H. Reama's method. The Laboratory Committee showed the method and practice of bronzing and staining metals. A beautiful brown was produced in a solution of copper sulphate and potassium chlorate—1 pound of sulphate and 4 ounces of chlorate to the gallon of water, used hot, on a heavy copper plate.

CLEVELAND.

Meets once a month at American House.

Secretary: CHARLES WERFT, 331 Strathmore Avenue, Cleveland.

The smoker held by the Cleveland Branch, January 29th, was a success from every standpoint. The attendance was good, notwithstanding the inclement weather. A number of Superintendents, being present, were called upon to make a few remarks; music was furnished by the Chembers Orchestra, and the Blackhall Troupe of Scottish Dancers gave very interesting dances. The speakers of the evening were Messrs. A. D. Sopher, R. H. Sliter, Charles Werft. H. J. Ter Doest read a paper on "Rapid Nickel-Plating," which will be published in the Review. A number of platers handed in their application for membership.

ST. LOUIS.

Meets fourth Saturday of each month at Public Library Assembly Rooms. Secretary, F. C. Rushton, 4405 Blair Avenue, St. Louis, Mo.

The third annual banquet of the St. Louis Branch, A. E. S., was held Saturday evening, January 22d, at the American Annex Hotel.

After a splendid turkey dinner, E. J. Musick, as chairman of Committee on Arrangements, introduced President H. H. Williams, who, after an address of welcome and a review of the past year's work, took charge of the program, which was as follows:

Song—Regal Trio.

H. J. Richards—"As Editor of the Review." (Note.—Mr. Richards, as usual, had everyone laughing; his reputation as a wit is firmly established.—F. C. Rushton, Secretary.)

C. B. Lord, General Superintendent, Wagner Electric Manufacturing Company.—Subject: "Foreman's Psychology."

E. W. Heil, Wichita, Kan.—"The Benefits to the Isolated Plater of Belonging to the A. E. S."

Song—Regal Trio.

Mr. Willmore, Chicago Branch, gave a few well-chosen remarks.

Mr. Proctor, Founder of the A. E. S., spoke of the pleasure it gave him to watch the development and progressiveness of the Society.

Lee W. Van Cleave, President Buck's Stove and Range Company, spoke of the pleasure it gave him to be present; that he came to listen, not to talk, and congratulated the St. Louis Branch on its work.

Song—Regal Trio.

Col. Hansjosten, Past Supreme President, A. E. S., proved his ability as an orator.

Frank P. Rushton, Secretary, was also called upon for a talk.

A telegram was received from Mrs. Barrows, Toronto, Ont., wishing success, but regretting that illness prevented Mr. Barrows from being present.

A telegram was also received from the Chicago Branch, sending greetings and success, with the admonition to "eat and be merry, as there will be slime in your solutions Monday morning."

Letters of regrets and greetings were received from Toronto Branch, Newark Branch; Walter Fraine, Supreme Secretary; W. A. Layman, President Wagner Electric Manufacturing Company; H. W. Strong, Superintendent Coleman Lamp Company, Wichita, Kan.; T. F. Parson, St. Louis Branch.

One new and very interesting feature of the banquet was the presence of the ladies. Several were heard to express themselves as hoping the St. Louis Branch would continue to invite the ladies in the future, as they enjoyed the occasion immensely.

At the conclusion of the program, the floor was cleared for dancing.

Messrs. Musick, Deubelbeis and Rushton deserve lots of credit for the hard work they performed, making this the most successful banquet yet held.

At the last regular meeting of this Branch we had the pleasure of having Mr. Heil, Wichita, Kan., with us for the first time. Mr. Proctor also attended the meeting.

H. J. Richards gave a very interesting talk on "Simultaneous Cleaning and Plating." Mr. Proctor and Mr. Robins also expressed their views on the matter.

Mr. Heil gave a good talk on "Rotary Plating."

PHILADELPHIA.

Meets first Friday of each month in the Harrison Laboratory Building, University of Pennsylvania, 34th and Spruce Streets. Secretary, Philip Uhl, 2432 North Twenty-ninth Street, Philadelphia.

The regular monthly meeting of Philadelphia Branch was held Friday, February 4th, President Samuel Barr presiding over a good attendance. A general discussion of "Brass Solutions" was held which claimed the attention of members.

H. L. Kirkpatrick, of the Chicago Branch, was a visitor.

CHICAGO.

Meets fourth Saturday of each month, 8 p. m., Western Building, Randolph Street and Michigan Avenue. Secretary, H. E. Willmore, 5911 South Boulevard, Chicago, Ill.

The regular monthly meeting was held January 22d. Owing to the absence of President O. E. Servis, Vice-President J. P. Manz occupied the chair.

Matters relating to our recent banquet were taken up and it was decided that it was the most successful affair of its kind ever given by Chicago Branch.

Librarian Meggers brought the following question before the meeting: "How can a pickle be made for steel stampings that will remove oil, scum and scale, and permit the stampings to be immediately rinsed and plated without peeling or blistering?"

J. H. Hall gave an intelligent talk on the removal of alloy from silver-plate.

TORONTO.

Meets fourth Tuesday of each month at Occident Hall, Bathurst and Queen Streets. Secretary, Ernest Coles, P. O. Box 5, Coleman P. O., Toronto, Ont.

The regular meeting of the Toronto Branch was held on January 27th, President Salmon presiding over an excellent attendance.

Discussions held on electro-galvanizing and cleaners and cleaning compound were held and proved to be both interesting and entertaining.

The galvanizing or zinc-plating, which was first taken up, was discussed with enthusiasm, the principal points discussed being the "throw" and the necessity of first copper-plating. One member, whose experience with the solution is by no means small, claimed that the "Meaker solution" gave better results than any (home-made or patented); another claimed that "toning salts" had increased or improved the "throw" in his; others made claim to good results without either—and so discussions go. As to the preliminary coppering, a member stated that absolute cleanliness, both physical and chemical, was all that was necessary for good work, and that the best electro-galvanizing done is deposited right on the iron; this phase of the discussion was also lively.

The cleaning question, which was next taken up, would have been particularly interesting to some of the manufacturers of them. First-hand opinions regarding patent compounds: where one member claimed excellent results with a certain compound, another would find flaws, and it seemed that in spite of the varying degrees of satisfaction expressed with compounds now to be had, memories of the old-time potash still remained sweet.

A very helpful feature in connection with the discussions was the presence at the meeting of Prof. Lash Miller, whose knowledge was a resort where chemical features and reactions were to the ""unlearned" not clear; what should take place was explained by the doctor. Dr. Miller holds a very warm spot in the esteem of the members of Toronto Branch, and it is a matter of regret that circumstances make it impossible for him to be present at all of our meetings, as a more enthusiastic or willing helper would indeed be hard to find. During the discussion of cleaners, Prof. Miller asked if members had ever tried "quicklime" to renovate or rejuvenate a still solution, and expressed the opinion that it should renew the caustic condition of it. More is expected to be heard of this at our next meeting.

With convention arrangements assuming a concrete basis, the committee have deemed it time to strike off sub-committees, and more to follow. "Everybody do a bit," seems to be the idea. The committees struck at this meeting were:

Hall and Headquarters Committee—W. S. Barrows, James Humphrey and W. W. Wells, Sr.

Publicity and Finance—E. Coles, Charles Orr and William Salmon.

Reception and Entertainment—William Salmon, James Elder, Thomas G. O'Keefe, John Acheson, Ed. Membery, W. W. Wells, Jr., W. Thompson, Rupert G. Bruce, James Humphrey and Philip J. Cooper.

BRIDGEPORT.

Meets third Friday of each month at the office of the Brass World, 260 John Street, Bridgeport, Conn. Secretary, Nelson Barnard, 858 Howard Ave., Bridgeport, Conn.

Bridgeport Branch are endeavoring to have a laboratory installed at each plant, so that the man in charge of the plating department will be able to work out any problem at once. The manufacturers here are taking hold of this matter in good shape, so by the end of this year we will have accomplished what we started out to do in this matter.

Since the boys have become interested, we have some very fine meetings, as it has brought out their ideas on the subject. After each meeting we give over one hour to discussion, so you see we desire to progress.

DAYTON.

Meets first Wednesday of each month at the Y. M. C. A., Dayton, Ohio, Secretary, Alphonz Lamourcux, 500 East First Street, Dayton, Ohio.

The regular meeting of Dayton Branch was held on Wednesday, February 2d, at which we had a very good outpouring of members who took a very keen interest in the routine business of the evening, after which we were addressed by H. M. Williams, chemist of the N. C. R. Co., who spoke quite at length on the general relations of chemistry to the various trades and showed in a very interesting manner the good the chemist has done in the various fields, particularly the plating game. Mr. Williams' talk, while informal, was very interesting and brought forth some very fine points along chemical lines.

At our March meeting we will be addressed by Mr. Rodger, electrician of the N. C. R., which will be a rare treat for everyone who comes; so all those who can should come. The meeting will be on Wednesday, March 1st, at the Y. M. C. A., at 8 p. m.

INDIANAPOLIS.

Meets second Saturday of each month at Hotel Dennison. Secretary, Louis Mertz, 1725 Union Street, Indianapolis, Ind.

The regular meeting February 12th was presided over by President Aufderheide. Mr. Sliter came in on us, which pleased the boys very much. In his address he was pleased to see the way the meetings are progressing and paid tribute to the Secretary, hoping to see him re-elected, and suggested that we put the A. E. S. before our employers. His address was well received.

Discussion arose as to the holding of an open meeting. Decided that we hold open meeting and smoker at our next regular meeting.

Committee of three appointed on arrangements: G. Holden, William Lamoureux and G. Barrows.

One application received: George S. Martin, 1805 Fairview street, Anderson, Ind.

Elected to membership: George Becktel, Central Plating Company, Indianapolis, Ind.

DETROIT.

Meets first Tuesday of each month at 26 East Congress Street. Secretary, B. E. Miller, 543 Townsend Avenue, Detroit, Mich.

The regular meeting of February 1st was called to order by President A. E. Wetmore, over one-half of our members being present.

For the good of the Society, the subject on "Hot Cyanide Copper Solution," when, with the use of cyanide or metal, it had no effect on said solution, the use of sulphuric acid to regenerate solution, was discussed pro and con.

A paper by B. E. Miller was read on the use of calcium chloride in nickel solutions.

Our banquet on January 8th, held in honor of Prof. Moore, in appreciation of the helpful instructions he has given to the members of this Branch, with the aid of our chairman, A. E. Wetmore and his witty remarks in introducing his so-called shining lights, altogether made it a very enjoyable evening.

Prof. Moore gave a long talk on his experience and travels, also upon the practice of chemistry.

A letter of regret was received from our Past Supreme President, C. H. Proctor, but owing to the good time we were having the letter was not read until our regular meeting, February 1st.

It has been decided that hereafter we will give banquets instead of smokers. "Hurrah!"

MILWAUKEE.

Meets first Friday of each month at West Side Bank Building, Third and Chestnut Streets. Secretary, E. C. Yaeger, 962 Ninth Street, Milwaukee, Wis.

NEWARK.

Meets first and third Friday of each month, 8 p. m., 47 Bank Street, Newark, N. J. Secretary, Geo. Rutler, Jr., 333 S. 19th Street, Newark, N. J.

CINCINNATI.

Meets once each month at Dennison Hotel, Cincinnati, Ohio. Secretary, F. H. Nordmann, 720 Froom Ave., Cincinnati, Ohio.

TOLEDO.

Meets the last Tuesday of each month at Toledo University. Secretary, James E. Nagle, 209 Navarre Ave., Toledo, Ohio.

ROCHESTER.

Meets second and fourth Friday of each month at University of Rochester. Secretary, C. V. Haring, 603 Dewey Avenue, Rochester, N. Y.

BUFFALO.

Meets first Saturday of each month at the University of Buffalo, 8 p. m. Secretary, John G. Murphy, 71 Dingens St., Buffalo, N. Y.

CHANGE OF ADDRESS.

Mr. Louis C. Donnell.....35 Seaview Av., Jersey City, N. J.
Mr. C. J. Sizelove.....959 Chancel Av., Irvington, N. J.
Mr. Clarence Van Derau.....2343 E. Fifth St., Dayton, O.
Mr. Guy D. Holdom.....726 DeQuincy Av., Indianapolis, Ind.
Mr. Jos. M. Johnston.....43 Parker St., Mansfield, O.
Mr. Wm. Hartzell.....346 Oakland Pl., Springfield, O.
Mr. Wm. J. Salmon.....104 Lake Front, Kew Beach, Toronto, Ont.
Mr. Joseph Wooldridge.....650 Shaw St., Toronto, Ontario

ELECTED TO MEMBERSHIP.

Cleveland Branch.

Mr. F. J. Kane.....1631 E. Twenty-second St., Cleveland, O.
Mr. Thos. Sweeney.....3185 W. Ninety-fifth St., Cleveland, O.
Mr. G. H. Randall.....2271 E. Ninety-fifth St., Cleveland, O.

Newark Branch.

Mr. Ed Wagner.....225 Hudson St., Hoboken, N. J.

St. Louis Branch.

Mr. Joseph T. Humbrecht.....3943 Lincoln Av., St. Louis, Mo.

Indianapolis Branch.

Mr. Geo. Becktel.....Central Plating Co., Indianapolis, Ind.

New York Branch.

Mr. D. W. Robinson.....126 John St., Ilion, N. Y.
Mr. Abram Schleimer.....Rutherford, N. J.

Bridgeport Branch.

Mr. Chas. C. Ney.....19 Eden Av., Southington, Conn.
Mr. Geo. E. Rich.....706 Howe Av., Shelton, Conn.
Mr. A. E. Maraffe.....372 Hanover St., Bridgeport, Conn.
Mr. Geo. M. Krouse.....212 Newfield Av., Bridgeport, Conn.

APPLICATIONS FOR MEMBERSHIP.

Toronto Branch.

Mr. Thos. W. Johnson.....8 Mitchell Av., Toronto, Ont.
Mr. F. Boynton.....464 Montrose Av., Toronto, Ont.
Mr. Chas. Atkinson.....76 Marguereta St., Toronto, Ont.
Mr. Wm. Jeffrey.....70 Jackman Av., Toronto, Ont.

Cleveland Branch.

Mr. Wm. B. Pleadwell.....2191 E. Sixty-ninth St., Cleveland, O.
Mr. B. F. McCormick.....7107 Colgate Av., Cleveland, O.
Mr. Wm. Ramerman.....6511 Mona Av., Cleveland, O.

Chicago Branch.

Mr. Arthur Stringer.....16 E. 118th St., Chicago, Ill.
Mr. Edward L'Hommedieu.....26 S. Clinton St., Chicago, Ill.

New York Branch.

Mr. Ernest J. Hapgood.....109 Grove St., West Lynn, Mass.
Mr. Martin G. Scholar.....238 Humboldt St., Brooklyn, N. Y.

Philadelphia Branch.

Mr. Harry B. Farrand.....Sellersville, Pa.

Indianapolis Branch.

Mr. Geo. S. Martin.....1805 Fairview St., Anderson, Ind.

AMERICAN ELECTRO-PLATERS' SOCIETY.

Office of the Secretary-Treasurer.

Dayton, Ohio.

Mr. H. J. Richards,

St. Louis, Mo.

Dear Sir:

The President directs that the result of the referendum vote of the Branches on the "Assistant Foreman" amendment be communicated to the various Branches. The vote stood eight in favor of retaining the amendment and seven in favor of rejecting it. The Buffalo Branch failed to register their vote. The Branches favoring retaining the amendment are: Philadelphia, Dayton, Cleveland, Bridgeport, Indianapolis, Toronto, Rochester and Detroit. Those in favor of rejecting the amendment are: New York, Newark, Milwaukee, Toledo, Chicago, Cincinnati and St. Louis. The President declares the amendment stands as adopted.

The Toronto Branch report progress in their plans for the 1916 convention in July and are very optimistic as to its success. In this connection it has been thought wise, in view of the fact that the war will still be going on, to inquire what formalities would be necessary for our delegates and vsitors, and especially those who are foreign-born, to comply with to enter Canada for the convention.

The President informs this office that the authorities say that foreign-born delegates and visitors will only need to show their naturalization papers and to state the purpose of their visit. No further questions will be asked than those which are asked of any Canadian citizen who has occasion to cross the border. Those of American birth who attend will only have to answer the usual questions regarding the purpose of their visit.

Steps are being taken at the present time to secure information regarding the conditions under which exhibits may be sent through the Canadian Customs for the convention. This information will be given to the Branches as soon as received.

It is suggested that plans for exhibits by the Branches should be started early in order that the Toronto Branch may know what arrangements are necessary on their part to provide for them. It is their intention to make the display rival that of the Dayton Convention and they solicit your co-operation to make this possible.

Yours very truly,

W. FRAINE,

Sec.-Treas., A. E. S.